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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/804,891	03/13/2001	Eit Drent	TS0982 (US)	1353

7590 08/13/2003

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EXAMINER

ZUCKER, PAUL A

ART UNIT	PAPER NUMBER
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1621

DATE MAILED: 08/13/2003

21

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Applicati n N .

09/804,891

Applicant(s)

DRENT ET AL.

Examiner

Paul A. Zucker

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 May 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Current Status

1. This action is responsive to Applicants' Letter of Response of 23 May 2003 in Paper No 20.
2. Claims 1-23 remain outstanding.
3. The Claims 1-13 are finally rejected under 35 U.S.C. 103(a) as being unpatentable over Slany et al (DE 19840253-A1 03-2000).

Instantly claimed is a process for the hydrocarbonylation of pentenenitrile to produce 5-cyanovaleric acid in the presence of a group VIII metal source, a bidentate phosphine ligand and an acid having a pKa of less than 3.

Slany teaches (Abstract) a process for the production of 5-cyanovaleric acid or its ester which employs very similar conditions to those of the instant invention. Slany teaches the use of a catalyst system which comprises:

- a. a palladium(II) compound (Group VIII metal);
- b. a bidentate phosphine ligand; and
- c. an anion source.

Slany teaches (Page 2, line 67 – page 4, line 34) phosphine ligands corresponding to those instantly claimed. Slany further teaches (page 4, lines 55-59) that the anion source is an organic acid having a pKa of 3.5 or higher. Slany teaches (page 4, lines 63-65) mol ratios of from 1-10 with respect to palladium. The Examiner notes that the

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open "comprising" language of instant claim 1 allows this as well. Slany further teaches (Page 6, lines 7-10) reaction temperatures 40-200 °C.

The difference between the instant process and that taught by Slany is that in the instant process an acid of pKa less than 3 is required.

Slany, however, teaches (page 4, lines 60-62) that a strong acid may be added.

The acids suggested by Slany include strong mineral acids such as perchloric acid or strong organic acids such as sulfonic acids and trichlor- or trifluoromethanesulfonic acids.

The instantly claimed process would therefore have been obvious to one of ordinary skill in the art. The motivation would have been to improve the process for production of 5-cyanovaleric acid taught by Slany by modifying it in the manner suggested by Slany. There would therefore have been a reasonable expectation of success.

Examiner's Response to Applicants' Remarks With Regard to This Rejection

4. Applicants have set forth arguments with regard to this rejection. The Examiner responds to these below:
 - a. Applicants argue (Response, page 2, 4th full paragraph) that Slany prefers the use of weak acids and Applicants' make a different selection (strong acids). While the Examiner agrees that Slany exemplifies the use of weak acids, Slany also teaches (page 4, lines 60-62; see also US 6,346,640, column 6, lines 1-5) that a strong acid may be added. The acids suggested by Slany include strong mineral acids such as perchloric acid or strong organic acids

- such as sulfonic acids and trichlor- or trifluoromethanesulfonic acids. The instant use of strong acids is therefore obvious over the teaching of Slany.
- b. Applicants further argue (Response, page 2, 5th and 6th full paragraphs) that the claims are all limited so that the substitution groups (R^1 - R^4) on the phosphorous atoms are all tertiary alkyl groups (in particular *t*-butyl) and that Slany does not use any tertiary butyl phosphine ligands in the examples or suggest that they are preferred. While Applicants are correct that Slany does not use any tertiary butyl phosphine ligands in the examples, the Examiner points out that this does not obviate the fact that Slany specifically names (Page 3, line 32; see also US 6,346,640, column 3, lines 41-42) a ligand of the invention, 1,3-bis(di-*t*-butylphosphino)propane, and teaches its suitability for use in the instantly claimed process. The use of this ligand is therefore obvious over the teaching of Slany.
- c. Applicants further argue that the di-*t*-butylphosphino ligand performs much better in the process than the di-isopropylphosphino ligand. While the Examiner agrees that Applicants have demonstrated this, the relevance of this result to the issues of this case is unclear.

Applicant's arguments filed 23 May 2003 have been fully considered but they are not persuasive for the reasons indicated above.

5. Claims 14-23 are finally rejected under 35 U.S.C. 103(a) as being unpatentable over Slany et al (DE 19840253-A1 03-2000), as applied to claims 1-13 above, and further in view of Di Cosimo et al (US 6,077,955 06-2000).

Instantly claimed is a process for the hydrocarbonylation of pentenenitrile to produce 5-cyanovaleric acid or its esters in the presence of a group VIII metal source, a bidentate phosphine ligand and an acid having a pKa of less than 3 and its further conversion to caprolactam.

Slany suggests (Page 2, lines 6-8) that 5-cyanovaleric acid or its esters are important for the production 6-amino-caproic acid and caprolactam. This constitutes a suggestion on the part of Slany that his process for the production of 5-cyanovaleric acid or its esters be combined with a process for the production of caprolactam.

The difference between the instantly claimed process and that taught by Slany is that Slany does not provide a specific process for the production of caprolactam.

Di Cosimo, however, teaches (Column 18, line 61- column 19, line 18) the reduction via catalytic hydrogenation of ω -cyanocarboxylic acids to the corresponding ω -aminocarboxylic acids and their subsequent cyclization to the lactams. In particular, Di Cosimo teaches (Example 37, Column 35, line 16 –column 36, line 10) the catalytic hydrogenation of 5-cyanopentanoic acid and cyclization of the resultant 5-aminopentanoic acid salt.

Thus the instantly claimed process would have been obvious to one of ordinary skill in the art. The motivation would have been to extend the process for the synthesis of 5-cyanovaleric acid or its esters taught by Slany to the synthesis of ϵ -caprolactam, an important polymer feedstock. This extension is, in fact, suggested by Slany. There would have been a reasonable expectation for success since the ω -cyanocarboxylic acid (5-cyanovaleric acid) required for the process of DiCosimo is provided by the process of Slaney.

Examiner's Response to Applicants' Remarks With Regard to This Rejection

6. Applicants reiterate their argument (Response, page 2, 5th and 6th full paragraphs) that the claims are all limited so that the substitution groups (R^1 - R^4) on the phosphorous atoms are all tertiary alkyl groups (in particular *t*-butyl) and that Slany does not use any tertiary butyl phosphine ligands in the examples or suggest that they are preferred. While Applicants are correct that Slany does not use any tertiary butyl phosphine ligands in the examples, the Examiner points out that this does not obviate the fact that Slany specifically names (Page 3, line 32; see also US 6,346,640, column 3, lines 41-42) a ligand of the invention, 1,3-bis(di-*t*-butylphosphino)propane, and teaches its suitability for use in the instantly claimed process. The use of this ligand is therefore obvious over the teaching of Slany.

Applicant's arguments filed 23 May 2003 have been fully considered but they are not persuasive for the reasons indicated above.

Conclusion

7. Claims 1-23 remain outstanding. Claims 1-23 are finally rejected.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Paul A. Zucker whose telephone number is 703-306-0512. The examiner can normally be reached on Monday-Friday 7:00-3:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Johann R. Richter can be reached on 703-308-4532. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-4556 for regular communications and 703-308-4556 for After Final communications.


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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1235.

Paul A. Zucker
Patent Examiner
Technology Center 1600

August 6, 2003



Johann Richter, Ph.D., Esq.
Supervisory Patent Examiner
Technology Center 1600